‘Apropos of the Dutch Vowel System’

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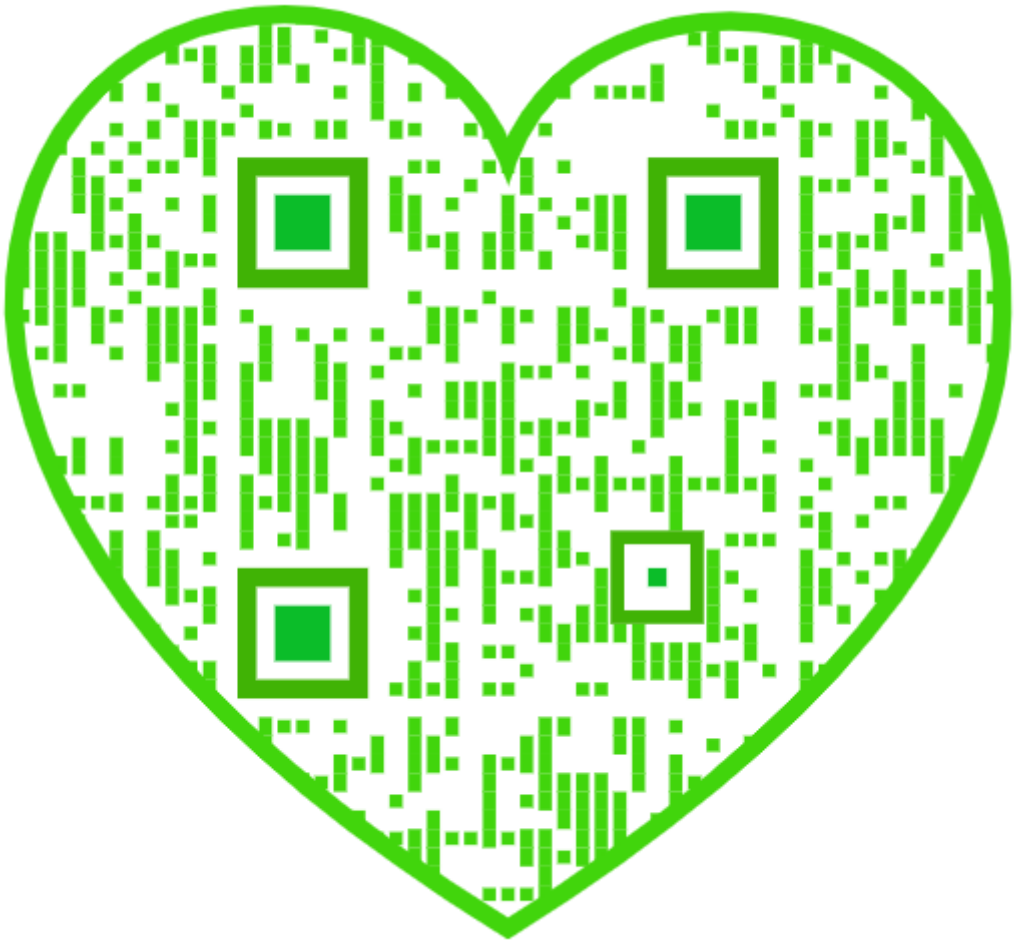

Apropos of the Dutch Vowel System.[1)]

By R.P.G. de Rijk, May 1967.

For reasons which I will come to in a moment, it is necessary to partition the vowels of Dutch into the following two classes:

Class I: ɑ, ɛ, i, ɔ, ø.
Class II: a, e, ī, o, ü, u, ö.

(I disregard the three loan phonemes ɛ̄, ø̄, and ɔ̄, which occur only in two or three words, such as / sɛ̄rə/, 'sunroom', / frø̄lə/, 'Freule', / rɔ̄zə/, 'pink', / kɔ̄r /, 'fraternity'.)

These are the traditional diagrams for representing each of the classes:

Class I:

i

ɛ ø ɔ

ɑ

Class II:

ī ü u

e ö o

a

The asymmetry of class I will be commented on later.

First, I will give some examples of morphemes in which these vowels occur. Between slashes I will put the informal representation that I am using and for which no theoretical status is claimed. In quite a few cases the lexical representation of the item in question will be different from, the form between slashes. English glosses will be given between quotes. Occasionally, the representation of the item in the current Dutch spelling system will be added between parentheses.

I.

1 /mɑn/, 'man', (man); /bɑst/, 'bast', (bast); /kɑr/, 'cart', (kar); /kɑt/, 'cat', (kat); /kɑlv/, 'calf', (kalf); /stɑl/, 'stable', (stal).

2. /bɛd/, ‘bed’, (bed); /vɛt/, ‘fat’, (vet); /nɛst/, ‘nest’, (nest); /pɛn/, ‘pen’, (pen); /mɛlk/, ‘milk’, (melk).
3. /wit/, ‘white’, (wit); /kin/, ‘chin’, (kin); /vis/, ‘fish’, (vis), /smid/, ‘smith’, (smid); /wild/ ‘wild’, (wild).
4. /kɔp/, ‘cup’, (kop); /zɔn/, ‘sun’, (zon); /bɔm/, ‘bomb’, (bom); /vɔ;rk/, ‘fork’, (vork); /vɔs/, ‘fox’, (vos).
5. /køs/, ‘kiss’, (kus); /tølp/, ‘tulip’, (tulp); /døn/, ‘thin’, (dun); /tørv/, ‘turf’, (turf); /ɣələk/, ‘happiness’, (geluk).

II.

1 /man/, ‘moon’, (maan); /lat/, ‘late’, (laat); /al/, ‘eel’, (aal); /kart/, ‘card’, (kaart); /mand/, ‘month’, (maand).
2. / ben/, ‘bone’, (been); /sxev/, ‘skew’, (scheef); /mer/, ‘more’, (meer) /vremd/, ‘strange’, (vreemd); /het/, ‘hot’, (heet).
3. /tīn/, ‘ten’, (tien); /dīv/, ‘thief’, (dief); /bīr/, ‘beer’, (bier); /vrīnd/, ‘friend’, (vriend); /dīp/, ‘deep’, (diep).
4. /bom/, ‘tree’, (boom); /bot/, ‘boat’, (boot); /or/, ‘ear’, (oor); /broz/, ‘frail’, (broos); /nord/, ‘north’, (noord).
5. /rüw/, ‘rough’, (ruw); /stürs/, ‘sullen’, (stuurs); /nü/, ‘now’,(nu) /füt/, ‘grebe’, (fuut); /rüzi/, ‘row’, (ruzie).
6. /buk/, ‘book’, (boek); /pus/, ‘pussy-cat’, (poes); /hu/, ‘how’,(hoe) /vut/, ‘foot’, (voet); /ɣud/, ‘good’, (goed).
7. /köz/, ‘choice’, (keus); /lök/, ‘funny’, (leuk), /pöl/, ‘pod’, (peul); /dör/, ‘door’, (deur); /stön/, ‘support’, (steun).

(Examples have been given rather lavishly, so as to permit comparison between cognate forms in Dutch and English.)

There are lots of minimal pairs involving these vowels. A few of them are;
/vɑl/, ‘trap’; /vɛl/, ‘skin’; /vil/, ‘(to)flay’; /vɔl/, ‘full’; /vøl/, ‘(to)fill; /val/, ‘ashen’, /vel/, ‘much’; /vīl/, ‘fell’; /bə-vol/, ‘commanded’; /vul/, ‘(to)feel’; (/völn/, ‘foal’).
/kɑn/, ‘jug’; /kɛn/, ‘(to)know’; /kin/, ‘chin’ /kɔn/, ’could‘; /køn/, ‘can’; /kan/, ‘barge’; /kon/, ‘cheek’; /kīn/, ‘lotto’; /kun/, ‘bold’.

The functional motivation for partitioning the vowels into the two classes given is that both of them behave as natural classes in a great many rules and morpheme structure conditions (one way, possibly not the best one, of expressing lexical regularities). I will give five examples to support this claim.

Ex.1 The formation of diminutives is a very productive and frequent process in Dutch. I will restrict the discussion of it here to stems ending in a sonorant consonant.

/mɑn/, ‘man’.	Dimin. /mɑnət^{y}ə/.
/kɑm /, ‘comb’.	Dimin. /kɑmət^{y}ə/.
/stɑŋ/, ‘bar’.	Dimin. /stɑŋət^{y}ə/.
/bɑl /, ‘ball’.	Dimin. /bɑlət^{y}ə/.
/spɑr/, ‘spruce fir’.	Dimin. /spɑrət^{y}ə/.

But:

/man/, ‘moon’.	Dimin. /mant^{y}ə/.
/ram/, ‘window’.	Dimin. / ramp^{y}ə/.
/stral/, ‘ray’.	Dimin. / stralt^{y}ə/.

All vowels of class I behave like /ɑ/ in that, when followed by a sonorant consonant, they take an epenthetic ə in the diminutive. None of the vowels of class II do so.

Part of the rules for diminutive formation will be:

[- unit] → [/ ə /] /[2)] [+ VOC][+ stress][+ l] [+ cons][+son] - DIM.

The underlying form of the diminutive suffix at this stage, I think, is a palatal voiceless stop followed by *ə* followed by *n*, but this is irrelevant to our present discussion.

That the feature stress is also needed here cannot be demonstrated with our monosyllabic examples, but follows from considering larger words, especially those ending in iŋ, like:

/vrémd-ə-lìŋ/, ‘stranger’; Dim. /vrémd-ə-lìŋ -ət^{y}ə/

/ hɛrhál-iŋ /, ‘repetition’; Dim. /hɛrhál-iŋ -k^{y}ə /.

I will not go here into the rules of stress assignment nor discuss the other rules of diminutive formation, since the only purpose of the example was to show that class I acts as a natural one.

Example 2. No vowels of class I occur morpheme-finally. (I disregard for a moment ə, which seems to end affixes, and more rarely, stems.) All vowels of class II may end morphemes:

/la/, ‘drawer’; /na/, ‘after’ /ra/, ‘yard’; /pa/, ‘dad’,
/me/, ‘along’; /ne/, ‘no’; /te/, ‘tea’; /ze/, ‘sea’, /fe/, ‘fairy’.
/dī/, ‘that’; /drī/, ‘three’; /zī/, ‘see’; /rüzī/, ‘row’.

/vlo/, ‘flea’; /stro/, ‘straw’; /provo/, ‘provo’.
/nü/, ‘now’; /ü/, ‘you’.
/du/, ‘do’; /hu/, ‘how’; /mu/, ‘tired’; /ku/, ‘cow’.
/bö/, ‘fed up’; /rö/, ‘male dog’; /snö/, ‘disappointing’.

Here II acts as a natural class. I will come back to this later.

Example 3. All and only the vowels of class I can occur before clusters of the form [+ cons] [- cont][+ grave] in morphemes. Since the same type of arguments as we have in English for deriving ŋ from *ng* apply to Dutch as well, we have as a consequence: Only vowels of class I can occur before ŋ.

The feature + consonantal appears in the rule to exclude both vowels and glides. The specification - continuant is present because there are morphemes like /twalv/, ‘twelve’, which exhibit a vowel of class II. The specification + grave is there in order to exclude dentals, so as to account for the existence of morphemes like:

/zelt/, ‘tench’; /vrīnd/, ‘friend’; /vremd/, ‘strange’ /stürs/, ‘sullen’; /bürt/, ‘neighbourhood’; /bīxt/, ‘confession’, and many others.

As stated, all vowels of class I occur in this environment:

/pɑlm/, ‘palm’; /ɑrm/, ‘arm’; / lɑmp/, ‘lamp’; /ɑlp/, ‘alp’; /hɑrp/, ‘harp’; / dɑnk/, ‘thank’; /vɑlk/, ‘falcon’; /pɑrk/, ‘park’; /lɑŋ/, /‘long’; /hɑŋ/, ‘hang’.

/hɛlm/, ‘helmet’; /bɛrm/, ‘grass verge’; /dɛmp/, ‘(to) damp‘; /wɛlp/, ‘whelp’; /tɛrp/, ‘ terp’; /dɛnk/, ‘think’; /mɛlk/, ‘milk’; /bɛrk/, ‘birch’; /ɛŋ/, ‘narrow’; /mɛŋ/, ‘(to) mix’.

/film/, ‘movie’; /firma/, company'; /rimpl/§ ‘wrinkle’; /vink/, ‘finch’; /t^{y}ilp/, ‘(to)chirp’; /s^{y}irp/, ‘(to)cheep’; /dirk/, ‘Dick’; /riŋ/, ‘ring’.

/lɔŋ/, ‘lung’; /mɔlm/, ‘mould’; /st rm/, ‘storm’, /rɔmp/, ‘trunk’; /stɔlp/, ‘glass bell’; /dɔrp/, ‘village’; /vɔnk/, ‘spark’, /vɔrk/, ‘fork’; /vɔlk/, ‘people’ /wɔlk/, ‘cloud’.

/wørm/, ‘worm’; /dømp/, ‘(to) dump’; /pølp/, ‘pulp’; /slørp/, ‘(to) gulp’; /dønk/, ‘opinion’; /zølk/, ‘such’; /sxørk/, ‘scoundrel’; /bøŋl/§, ‘(to)dangle’.

Example 4. Before voiced fricatives all vowels of class II occur, but no vowels of class I.

I will discuss this rule and its apparent exceptions (stems ending in -ɣ later on. There are two real exceptions to this rule which I am aware of: /pøzl/ ‘puzzle’ and /mɑzl/, ‘luck’. These words are felt as foreign and tend to be pronounced with a voiceless sibilant instead of a voiced one.

Example 5. Only a vowel of class II can be followed by a glide which disagrees in gravity with that vowel.

That is, we find *ay, ew, iw, oy, uy, üw*, but not *ɑy, *ɛw, *iw, *ɔy, *ow. I will return to this fact later.

§ Note §: Dutch orthography would represent /rimpl/ and /buŋl/ as *rimpel* and *bungel*, where *e* spells the clearly pronounced, ə-sound. But I propose to handle such cases by a rule of ə-insertion:
[- unit] → [/ə/][note (2): By ‘[/ə/]’ I mean to designate in an informal way the set of features needed to define the neutral vowel ə̲.] / [+ voc][+ 1 stress] C_O [+ son]
This will eliminate all but all ə's from the lexical representations of stems.

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A careful study of Dutch phonology would, no doubt, bring to light more cases in which the classes I and II act as natural classes. But I think that the evidence adduced is already sufficient to establish the truth of the claim that I and II are indeed natural classes.

As I am using the notion of ‘natural class’, it seems proper to start talking now about distinctive features.

According to Professor Halle's well-known definition, a class of segments is called natural iff it contains no member which can be characterized with less features than it takes to define the whole class. We could also define the notion of degrees of naturalness of classes in terms of the number of features needed for their definition. The most natural classes, then, are those defined by the value of a single feature.

Let us try, therefore, whether our class I can be defined by a single feature F. plausible candidates for F are the features *tenseness* and *length*.

On what basis will we make a choice between those alternatives? Will we base ourselves on the phonetic properties of the vowels in question? We will indeed, but we shouldn't. We shouldn't, because there is a whole phonology in between the underlying representation and the phonetic output. Phonological rules may turn tense vowels into lax ones, lax ones into short, short into long, and so on, in many, or even all, environments.

If not the phonetic properties, then what should the basis for our decision be?

The answer is, obviously, phonological theory. Phonological theory, and I don't think I am the first to say this, should provide us with an explicit characterization of the notion of ‘possible rule’.

It is not enough for phonological theory to explicate the concept of 'linguistically significant generalization', so that we know what constraints there are on the abstract form of rules, e.g., that α rules, paired angles or negative contexts are, or are not, allowed in certain cases. It should also constrain the form of rules in terms of their actual feature content. It should provide a general concept of notions like 'diphthongization' and 'vowel shift'. (Surely, not just any rule that changes the quality of a vowel should be considered a vowel shift: not so, e.g., the rule ŏ → ā, which differentiates American from British English.) Then it should go on to make statements like:

'Only long vowels can undergo diphthongization' and 'Only tense vowels can undergo vowel shift'. Of course, the above claims are meant as illustrations only. They are examples of the type of statement general phonology will be expected to make. The particular claims made may well turn out to be false. Wayles Browne pointed out to me a case in a Serbian dialect, where *lax* vowels underwent vowel shift.

With such a theory, we would have a right method for deciding in many cases which of several available features to use as distinctive in the basic lexical representations.

Unfortunately, we cannot postpone our decision until the happy times when phonological theory will have a firm grasp on its problems. We must choose here and now.

Looking at the rules of Dutch phonology, we find that there is at least one rule of diphthongization (which see later). This may militate in favor of the feature length. However, we also find several rules that are very similar to tensing and laxing rules in English. So we are left where we were.

The authors of the book ‘Fonologie van het Nederlands en het Fries’ (A. Cohen, C.L. Ebeling, P. Eringa, K. Fokkema, A.G.F. van Holk; 's-Gravenhage 1959) argue there on articulatory and acoustic grounds that the distinctive feature that differentiates class I from class II is tenseness. (o.c., p.11-15)

All vowels of class I are - tense, whereas all vowels of class II are + tense. As to phonetic length, all lax vowels are also short., but not all tense vowels are long: tense ī and tense u are always realized short.

We will adopt the feature tenseness as distinctive for Dutch vowels. I will also simplify the notation in that I will write tense vowels as double vowels, and lax vowels as single vowels. Thus, henceforth, α will be written *a, a* will be written *aa, ɛ* will be written *e, e* as *ee*, and so on.

Repeating the diagram on page 1, we now get:

I										
i										
				e			ö			o
							a			
II										
ii						üü				uu
			ee			öö			oo	
						aa				

We notice, of course, that *aa* is the tense counterpart of *a, ee* of *e, oo* of *o, ii* of *i* and *oo* of *o*.

In the case of the vowels *a, e*, and *o* there are alternations in the Dutch system which show that the lax vowel bears a functional relationship to the corresponding tense one. These alternations, however, are exceptional rather than regular. They involve minor rules.

Normally, stems do not change their vowels at all when taking the plural ending, but those which do, just tense their vowel in the final syllable.

Thus:

‘path’: /pad/	Plural: /paadə/.
‘barrel’: /vat/	Plural: /vaatə/.
‘hole’: /ɣat/	Plural: /ɣaatə/.
‘day’: /daɣ/	Plural: /daaɣə/.
‘roof’: /dak/	Plural: /daakə/.
‘glass’: /ɣlaz/	Plural: /ɣlaazə/.
‘staff’: /stav	Plural: /staavə/.

With an extra irregularity:

‘wheel’: /rad/	Plural: /raadərə/.
‘leaf’: /blad/	Plural: /blaadərə/.

A unique irregularity has:

‘city’: /stad/	Plural: /steedə/

Also, in the past tense, a subclass of strong verbs has *a* in the singular and *aa* in the plural:

‘to eat’: /ik at/	/wei aatə/.
‘to pray’: /ik bad/	wei baadə/.
‘to command’: /ik bəval/	/wei bəvoolə/.
‘to break’: /ik brak/	/wei braakə/.
‘to give’: /ik ɣav/	/wei ɣaavə/.
‘to come’: /ik kwam/	/wei kwaamə/.
‘to lie’: /ik laɣ/	/wei laaɣə
‘to read’: /ik laz/	wei laazə/.
‘to mesure’: /ik mat/	/wei maatə/.
‘to take’: /ik nam/	/wei naamə.
‘to speak’: /ik sprak/	/wei spraakə/.
‘to sting’: /ik stak/	/wei staakə/.

‘to steal’: /ik stal/	/wei staalə/.
‘to feed on’: /ik vrat/	/wei vraatə.
‘to sit’: /ik zat/	/wei zaatə/.

A few *e* versus *ee* alternations can also be found:

‘way’: /weɣ/	versus plural	/weeɣə/.
‘prayer’: /ɣəbed/	versus plural	/ɣəbeedə/.
‘lack’: /ɣəbrek/	vers. plural	/ɣəbreekə/.

Some *o* versus *oo* alternations:

‘god’: /ɣod/	Plural /ɣoodə/.
‘lot’: /lot/	Plural /lootə/.
‘cavern’: /hol/	Plural /hoolə/.
‘lock’: /slot/	Plural /slootə/.
‘shot’: /sxot/	Plural /sxootə/.

There are no clear alternations of this type involving any of the other vowels (to wit, the high vowels and ö).

Looking again at the vowel diagram of page 9, we notice that the lax counterparts of *uu* and *üü* seem to be missing. As the lexical representations as well as the phonological rules are in terms of features, not phonemes, we cannot afford to just ignore the absence of these vowels. Looking at the system, it seems quite natural to claim that *o* is the lax counterpart of both *oo* and *uu* and that *ö* is the lax counterpart of both *öö* and *üü*.

To state this, we can write the following rule:

Lowering Rule: [+ voc][+ round][- tense] → [- high].

There is a fact which provides evidence for this:

In Dutch, two kinds of lax *o* sounds occur: o̞ and o, where o is lower than o̞. Now, there are two varieties of Standard Dutch.

For the first one, the occurrence of *o* versus *{o}* is determined purely by the phonetic context. A generative phonology will handle this by means of low level phonetic rules for specifying degrees of lowness. In the second variety, however, o̞ and o contrast in the same phonetic environment:

/zei sxro̞kə/, ‘they were ‘frightened’,	but: /zei sxrokə/, ‘they gobble’.
/do̞l/, ‘frantic’,	but: /dol/, ‘thole’.
/po̞p/, ‘doll’,	but: /pop/, ‘guilder’.
/(hei) po̞rt/, ‘(he) prods’,	but: /port/, ‘Port’.

The second variety, then, has the following system of lax vowels:

i

o̞

e ö o

a

But there is no such distinction for tense *oo*.

The above arrangement of vowels strongly suggests that at least in those cases where o̞ and o contrast, o̞ should be considered underlying lax *u*.

The first variety has blurred out the distinction between lax *o* and lax *u* altogether.

That means that here the Lowering Rule precedes all the low level phonetic rules, which is not the case in the second variety of Dutch. Of the distinction between lax ö and lax ü no traces remain. The theory of Marking indeed predicts that we could not have the reverse situation, namely, preservation of the *ö* - *ü* distinction and obliteration of the *o* - *u* one.

In this paper, I will henceforth limit myself to the variety of Dutch first mentioned, the one that does not preserve the distinction. It is clear that the Lowering Rule must follow all the tensing rules, since we still find *uu* and *üü* in all cases where tensing rules have applied.

Now that we arrived at an underlyingly symmetric vowel system, we will consider some rules of tensing and laxing.

We have seen earlier that no lax vowels occur in morpheme-final position. As it will turn out to be convenient to assume that in some cases vowels start out lax in this position, I propose the following rule.

First Tensing Rule: [+ voc] → [+ tense] / - [- segm].

In order to account for morphemes ending in *ə* , I suggest representing them in the lexicon as ending in *n*. Then a rule of epenthesis will insert an ə. (A better way of saying this is presumably that this is one of the many contexts in which a sonorant in Dutch is predictably syllabic.) A late rule will drop all *n*'s (just *n*, no other nasals) after *ə*. Although Dutch orthography distinguishes between the spellings ‘reden’, ‘reason’ and ‘rede’, ‘Reason’, I don't think that the language as spoken in Holland warrant this distinction. And even if it did, I could still consider the former form a simple exception to the *n* - dropping rule. Hence I represent both items as /reedn/.

If it turns out, as I think it may, that all instances of ə which are not demonstrably reduced variants of some other vowel can be treated as the result of an epenthesis rule, then it is easy to explain why *ə* never gets stress. We will simply have the rules of stress assignment apply before the epenthesis takes place.

Let us now devote some space to the fact which was mentioned before, namely the fact that only tense vowels occur before voiced fricatives. We will first investigate the behavior of voiced *stops* in the same position. They occur freely after tense as well as after lax vowels. With lax vowels:

/rob/, ‘seal’; /rib/, ‘rib’; /leb/, ‘rennet’; /kwab/, ‘lobe’; /eb/, ‘ebb’; /tobə/, ‘tub’; /krib/, ‘crib’; /dobr/, ‘float’; /blöbr/, ‘slush’; /robr/, ‘robber’; /röbr/, ‘rubber’; /rabii/, ‘rabbi’.

/bod/, ‘bid’; /vod/, ‘rag’; /bed/, ‘bed’; /wed/, ‘ (to)bet’; /bad/, ‘bath’; /lid/, ‘member’; /smid/, ‘smith’; /modr/, ‘mud’; /knödə/, ‘flop’; /sxöd/, ‘(to)shake’; /adr/, ‘adder’.

With tense vowels:

/soobr/, ‘sober’; /saabl/, ‘sable’; /tüü;bə/, ‘tube’; /faabl/, ‘fable’; /kwiibös/, ‘jackanapes’; /püübr/, ‘adolescent’; /amööbə/, ‘amoeba’; /hooboo/, ‘oboe’.

/daadl/, ‘date’; /raad/, ‘advice’; /sxaadüüw/, ‘shade’; /draad/, ‘thread’; /breed/, ‘broad’; /wreed/, ‘cruel’; /Leed/, ‘sorrow’; /eed/, ‘oath’; /brood/, ‘bread’; /lood/, ‘lead’; /rood/, ‘red’; /nood/, ‘need’; /ɣ uud/, ‘good’; /huud/, ‘hat’; /muud/, ‘courage’; /vluud/, ‘flood’; /liid/, ‘song’; /ziid/, ‘(to)seethe’.

Voiced fricatives other than γ occur after all tense vowels, but fail to occur after any lax vowel.

/dwaaz/, ‘fool’; /kaaz/, ‘cheese’; /maaz/, ‘mesh’; /vaaz/, ‘vase’; /snaavl/, ‘beak’; /haavr/, ‘oats’.

/leez/, ‘read’; /peez/, ‘sinew’; /meez/, ‘titmouse’; /eezl/, ‘donkey’; /γeevl/, ‘façade’; /sxeev/, ‘skew’; /zeevn/, ‘seven’.

/kiiz/, ‘molar’; /viiz/, ‘dirty’, /kiizl/, ‘gravel’; /diiv/, ‘thief’; /liiv/, ‘dear’; /briiv/, ‘letter’; /riivaal/, ‘rival’.

/booz/, ‘angry’; /rooz/, ‘rose’; /proozaa/, ‘proze’; /doov/, ‘deaf’; /oovn/, ‘oven’; /boovn/, ‘up’.

/rööz/, ‘giant’; /lööz/ ‘slogan’; /röözl/, ‘fat’; /öövl/, ‘evil’; /köövl/, ‘chatter’; /köözə/, ‘choice’.

/müüzə/, ‘muse’; /rüüzii/, ‘quarrel’; /düüvl/, ‘devil’;/müüziik/, ‘music’; /bədüüzd/, ‘dazed’.

/buuv/, ‘rogue’, /snuuv/, ‘(to)brag’; /uuvr/, ‘shore’; /suuz/, ‘puff’; /buuzm/, ‘bosom’; /sxruuv/, ‘screw’.

The voiced velar fricative γ is exceptional in that it allows both tense and lax vowels before it:

Tense vowels: /laaγ/, ‘low’; /maaγ/, ‘stomach’; /vlaaγ/, ‘squall’; /deeγ/, ‘dough’; /leeγ/, ‘empty’; /zeeγn/, ‘blessing’;/wiiγ/, ‘cradle’; /vliiγ/, ‘fly’; /drooγ/, ‘dry’; /hooγ/, ‘high’; /tooγaa/, ‘gown’; /tööγ/, ‘draught’; /zööγ/, ‘sow’; /spüüγ/, ‘spit’; /buuγ/, ‘bow’; /kruuγ/, ‘pub’; /zwuuγ/, ‘toil’.

Lax vowels: /plaγ/, ‘sod’; /vlaγ/, ‘flag’; /dreγ/, ‘drag’; /keγ/, ‘wedge’; /biγ/, ‘pigling’; /wiγ/ ‘wedge’; /loγ/, ‘ponderous’; /troγ/, ‘trough’; /brüγ/, ‘bridge’; /müγ/, ‘gnat’; /rüγ/, ‘back’; /vlüγ/, ‘fast’.

If we take a look at the system of stops and fricatives of Dutch, the exceptional behavior of ɣ can be explained quite satisfactorily.

p	t	k
b	d	-
f	s	x
v	z	ɣ

There is a voicing correlation in stops and fricatives, but *k* appears to lack a voiced counterpart. In terms of Markedness, it is inadmissable that voicing should be distinctive in velar fricatives but not in velar stops. So we are forced to postulate an underlying voiced velar stop: *g*. In order to account for the absence of [g] in the phonetic output - except before a voiced stop (e. g., in /zak+duuk/, 'handkerchief'), where its source is /k/ -, the most reasonable solution is to have a rule g → ɣ, that is: [- son][+ grave][- diff] → [+ cont].

It is not true to say that all Dutch ɣ's are derived in this fashion. For one thing, this would break the symmetry of the fricative system. Secondly, words like /maaɣd/, 'virgin' cannot have underlying *g*, as we will see below.

Once we have a rule g → ɣ, we can claim that all instances of ɣ after lax vowels come from underlying *g*, for, voiced *stops*, as we have seen, do occur after lax vowels. Further evidence in favor of this is that, in a position where no voiced stops are allowed, such as before another stop, we never find ɣ preceded by a lax vowel, but always by a tense one.

This is shown by such words as: /maaɣd/, ‘virgin’ /vooɣd/ ‘guardian’; /dööɣd/, ‘virtue’, / yööɣd/, ‘youth’; /vrööɣdə/, ‘joy’.

We are thus justified in upholding the generalization that only tense vowels occur before voiced fricatives. For later use, I will state this result in the form of a phonological rule rather than as a condition on lexical representations. Since at the end of morphemes vowels are tense anyway, the rule can be said to apply across morpheme-boundaries, as a decent phonological rule ought to do. Thus we have a

Second Tensing Rule: [+voc] → [+tense] / - [+ cont][+ voiced].

The feature ‘consonantal’ has been left out of the environment of the rule for a good reason. Marking conventions redundantly mark all vowels as + continuant and + voiced. Our rule, therefore, also applies before vowels. This is just as we want it to be, since there are no phonetically lax vowels immediately preceding other vowels. Thus the first vowel is tense in words like: /düüoo/, ‘duo’; /piias/, ‘clown’; /kiiosk/, ‘kiosk’; /teeaatr/, ‘theatre’; /biioskoop/, ‘movie theatre’.

Note, incidentally, that the rule does not say anything as to whether in this particular context the underlying vowel is lax, or tense, or can be either. Later we will find some indications that indeed both types of vowel occur in such positions.

The last tensing rule which I will consider here is the following:

Third Tensing Rule: [+voc] → [+tense] / [-][+ high] [+cons] [+voiced].

I assume that this rule comes before the *ə* insertion rules. If it does not, a special provision must be added. For, before *ə* we do find lax high vowels, as in /dilə/, ‘dill’; /imərs/, ‘for’; /kibəl/, ‘(to)bicker’; /kikər/, ‘frog’.

The rule explains why the first vowel is always tense in words like: /siiɣaar/, ‘cigar’; /stüükadoor/, ‘plasterer’, /stüüdii/, ‘study’; /üünii/, ‘union’; /iidee/, ‘idea’; /uukaazə/, ‘ukaze’;/liilaa/, ‘lilac’; /miiniimöm/, ‘minimum’.

ts, which occurs in foreign words only, acts as a single consonant: /pooliitsii/, ‘police’ /müüniitsii/, ‘munitions’; /konstiitüütsii/, ‘constitution’; /sübstiitüütsii/, ‘substitution’.

The rule does not generalize to non-high vowels, we have:
/bokaal/, ‘beaker’; /ponii/, ‘ponny’; /lorii/, ‘lorry’; /kakou/, ‘cocoa’; /kabaal/, ‘noise’; /banaal/, ‘banal’.

The prefix *in-* apparently has a boundary across which the rule does not apply: /in=aadm/, ‘(to)breath in’; /in=ent/, ‘(to)inoculate’; /in=een/, ‘together’; /in=ooxst/, ‘(to)gather in’.

Finally, we have seen on page 5 that only lax vowels occur in the context -’ - [+cons] [-cont][+ grave]. There are a few cases (wiŋərd, boŋərd, which see later) for which it seems appropriate to have a rule which laxes vowels in this context. Hence we write:

Laxing Rule: [+ voc] → [- tense] / - [+ cons] >[- cont][+ grave].

After these preliminaries we can now turn our attention to the Dutch diphthongs.

The diphthongs beginning with a tense vowel are:

aay as in /fraay/, ‘nice’, (fraai).
eew as in /leew/, ‘lion’; (leeuw).
iiw as in /niiw/, ‘new’, (nieuw).
ooy as in /mooy/, ‘nice’, (mooi).
uuy as in /ɣruuy/, ‘growth’, (groei).
üüw as in /düüw/, ‘push’, (duw).
ööy as in /kööy/, ‘cue’, (keu).

(ööy does not contrast with final öö.)

The first thing to observe is that *aaw, *eey, *iiy, *oow, *uuw, *üüy, *ööw do not occur in standard Dutch.

The second thing to notice is that with almost no exceptions the cited forms *aay, eew, iiw* etc. never occur anywhere else than before a boundary. (There are two exceptions I can think of: /türkooys/, ‘turquoise’ and /kaayman/, ‘cayman’, two very rare words.) Also /ooyt/, ‘ever’ and /zuut x ə *vooyst*/, ‘mellow-voiced’. (Old French Loan) Both of the observations are accounted for by the following rule which I will adopt:

Glide Adding Rule: [-unit] → [- voc][- cons][+ div][-α grave] / [+ voc][+ tense][α grave] - [- segm].

This rule adds a glide to all final tense vowels. How does it come, then, that we still find final tense vowels in Dutch? The answer is that those can be derived from underlying lax vowels by subsequent application (i.e., after the Glide Adding Rule) of the First Tensing Rule which we discussed earlier (page 13).

If we agree to disregard *oy*, which occurs only in a few loanwords (/royaal/, ‘generous’, /loyaal/, ‘loyal’, /royeer/, ‘(to)strike off’) the only remaining Dutch diphthongs are:

ei as in:	/reik/, ‘rich’, (rijk); /peil/, ‘arrow’, (pijl); /vrei/, ‘free’, (vrij); /klein/, ‘little’, (klein); /ei/, ‘egg’, (ei).
öü as in:	/höüz/, ‘house’, (huis); /löü/, ‘lazy’, (lui), /ö;üt/, ‘out’, (uit); kröük/, ‘jar’, (kruik); /vöül/, ‘dirty’, (vuil).
ou as in:	/hout/, ‘wood’, (hout); /oud/, ‘old’, (oud), /blou/, ‘blue’, (blauw); /rou/, ‘mourning’, (rouw); /vrou/, ‘woman’, (vrouw).

These diphthongs occur just in those contexts in which we also find tense vowels, except, understandably, before glides.

This system of diphthongs is characterized by the following constraints:

1. The second element must be high.
2. The first element must be non-high.
3. The first element must agree with the second in gravity' and rounding.

This may explain why the diphthong *ai*, so common in English and German, is not found at all in Dutch. The second element of a diphthong starting with *a* would have to be fronted and unrounded, i.e. f, a sound completely foreign to the Dutch system.

The curious way in which they are constrained makes it tempting to derive the Dutch diphthongs from tense high vowels. I will explore this possibility in the rest of this paper.

At this point a parenthetical remark on the historical development[2a)] might be welcomed. The diachronics are rather complex.

ei continues **ii*, but also **ai*.
öü continues **üü* (which again derives from *uu*), but also **eu*.
ou continues **al*, **ol* and **aaw*.

(All this, of course, under certain more or less well known conditions.) Moreover, several of the present-day tense vowels derive from older diphthongs:

Proto Germanic *ii → ei.
Proto Germanic *ee → *ie → ii.
Proto Germanic *uu → üü → öü.
Proto Germanic *oo → *uo → uu.

These changes could be compared with the development of stressed vowels in open syllables from Vulgar Latin to Paleo-French, where a difference of, presumably, compactness determined whether the diphthong was going to be a rising or a falling one:

*e → e̯i̯,
*epsilon; → i̯e,
*o → ou̯ (later ö or ø),
*ɔ → u̯o.

Let us now return to the synchronic analysis of Dutch diphthongs. We will, at first, limit our attention to *öü*.

If we look at the distibution of *öü* in terms of the following consonant, we find that *öü* appears before all consonants except before *w* and *r*. Now, *üü* is quite frequent before *w* and *r*, but very rare anywhere else. E.g., /rüüw/, ‘rough’; /slüüw/, ‘sly’,/üü/, ‘you’; /düüw/, ‘push’; /hüüw/, ’ (to)wed’; /peelüüw/, ‘bolster’; /sxaadüüw/, ‘shade’; /rüüwiinɑ/, ‘ruins’; /büür/, ‘neighbour’, /düür/, ‘expensive’; /hüür/, ‘rent’; /züür/, ‘sour’; /müür/, ‘wall’; /vüür/, ‘fire’; /stüür/, ‘steering wheel’; /üür/, ‘hour’.

In order to account for the facts of distribution, we will have a rule that changes *üü* to *öü* in a certain context.

This rule can be described in an easy way, if we may regard a tense vowel as a sequence of two lax ones. It would then suffice to say that the second vowel becomes - vocalic. At a later stage, the Lowering Rule, which we already discussed, will turn lax *ü* into *ö*.

It is, however, far from easy to state a diphthongization rule in our present theory. The input of the rule is a tense high vowel, and the output the corresponding lax vowel followed by a homorganic glide. To do this neatly requires two rules:

1. [- unit] → [- voc][- cons][α back][α round] / [+ voc][+ tense][α back][α round] ----- ‘Environm.’

2. [+ voc] → [- tense] / --- [- voc][- cons].

(Or, alternatively, in the opposite order, with a few changes.)

In order for this to work, we need a mechanism able to specify that the application of rule 2 is restricted to the output of rule 1, since, in general, vowels do not become lax before glides. (According to Professor Chomsky's recent class lectures such a mechanism is also needed for a description of velar softening in English.)

For diphthongization, however, no such mechanism would be needed if we could solve the problem in the following fashion:

Suppose the distinctive feature is length rather than tenseness. In the lexical representations we may have sequences of two short vowels. No long vowels appear as such in the lexicon. An interpretative convention would apply to the output of the phonology, and say that a sequence of two identical short vowels is to be interpreted as a long vowel if and only if there is no boundary of any sort between them. Long vowels can also result from two short vowels across morpheme (or even word-) boundaries, but this can probably be handled by means of previous erasure of the boundary in question.

Assuming, then, that only identical vowels appear in sequence in the underlying forms of Dutch at the stage where the diphthongization rule applies, we can state it in this simple way:

[+ voc] → [- voc] / [+voc] ---- .....

Here we have to specify only what vowels become diphthongized in what context.

Returning now the case of Dutch ou, we still have to face the choice between a rule üü → öü and öü → üü.

The preceding paragraph contains no argument for the first as against the second rule. If the latter rule is the correct one, then there is no underlying üü, and hence the whole analysis of the Dutch vowel system as given above, including the Lowering Rule, is simply wrong. However, there are some reasons to believe that the first rule is the right one. First, ceteris paribus, we prefer to have tense vowels rather than diphthongs in the lexicon, on general grounds of Markedness. Second, we have a somewhat stronger argument to favor the rule üü → öü: there is a considerable number of words where we find *üü* not followed by *r* or *w*. If we derive the diphthong from the vowel, we can state these morphemes as exceptions to the rule which does so. In fact, we will see that almost all of these exceptions can be accounted for quite easily. If, however, we derive the vowel from the diphthong we have no such easy way of handling the exceptions. We could put *üü* as well as *öü* in the lexical representations, or else allow ourselves a new minor rule.

Taking *üü* as basic and *öü* as derived makes it possible to put *üü* and nothing else in the lexicon.

We therefore choose, as our first try, the rule:

Rule Dip.: üü → ü̯.

(We may note, as a confirmation, that this rule represents the actual historical process.)

What, now, is the environment in which the rule applies?

Answer: anywhere, except before *r* and *w*. So it looks like we need a negative environment.

Suppose now we have a phonological theory that disallows negative environments and also arbitrary rule features. Thus we are not allowed to say, e.g.:

[+ voc] → [- Dip] / ----- {/w/}{/r/}.

We will then have to state the rule with a positive environment.

The attempt to do so without overcomplicating the statement of the rule, will force us to a deeper analysis of the facts.

To start with, we may note that *w* is the only glide occurring after *üü*. Hence we can state the rule as follows:

Rule Dip. üü → üu̯ / --- {[- segm][+ voc][+ cons]}.

It is not unreasonable that Rule Dip does not apply before glides. If it applied, it would result in a sequence of two glides, which is inadmissible in the Dutch system (for this reason we never find *ou̯y, or e̯iw in Dutch).

How are we going to prevent -*üür* from undergoing rule Dip?

Answer: we do not have to, and nothing has to be changed in the formulation of the rule as it stands above.

This answer is rather surprising. Why, then, don't we get *öür*?

The key to this problem lies in the observation that tenseness of high vowels can be predicted before *r*.

The facts are as follows;

1. We never find tense high vowels before *r* followed by a grave consonant, but lax ones we find in abundance.

Examples: /sxürft/, ‘scabies’; /türv/, ‘peat’; /mürv/, ‘mellow’; /würm/, ‘worm’; /firmaa/, ‘company’; /pürpr/, ‘purple’; /s^{y}irp/, ‘(to)cheep’; /yürk/, ‘dress’; /nürks/, ‘peevish’; /snürk/, ‘(to)snore’; /dirk/, ‘Dick’; /sirkös/, ‘circus’.
uu does not occur in this context, but *o* does.

2. We do not find tense high vowels before *r* followed by a - grave sonorant, but there are a few instances of a lax vowel in that position: /türn/, ‘(to)do gymnastics’, /ürn/, ‘urn’.

3. Before *r* followed by a dental (non-nasal) stop or continuant high vowels are found only tense:
/büürt/, ‘neighbourhood’, /stüürs/, ‘sullen’; /wiird /, ‘mound’; /sliirt/, ‘string’; /wuurd/, ‘drake’, /zwuurd/, ‘bacon rind’.

4. Before *r* followed by a vowel, we only find tense vowels (a special case of the Third Tensing Rule): /wiirook/, ‘incense’,/büüroo/, ‘desk’; /füürii/, ‘fury’; /füüroorə/, ‘furore’; /üüriinə/, ‘urine’.

5. Before *r* followed by a boundary, we find tense high vowels, no lax ones: /biir/, ‘beer’; /diir/, ‘animal’, /miir/, ‘ant’, /stiir/, ‘bull’; /düür/, ‘expensive’; /müür/, ‘wall’; /vüür/, ‘fire’; /sxüür/, ‘shed’; /buur/, ‘farmer’ /stuur/, ‘ stout’; /vuur/, ‘feed’; /snuur/, ‘cord’.

We do not find this predictability of the tenseness of high vowels before 1.

Note such pairs as: /wil/, ‘will’; /wiil/, ‘wheel’; /sxril/, ‘shrill’; /sxriil/.‘parsimonious’; /kil/, ‘chilly’; /kiil/‘ keel’./stil/, ‘silent’; /stiil/,‘trade’.

And with *ü* versus *öü*: /vül/, ‘(to)fill’; /vöül/, ‘dirty’; /mül/, ‘loose’; /möül/, ‘mule’; /prül/, ‘rubbish’; /pröül/, ‘pout’; /pül/, ‘jug’; /pöül/, ‘(to)bulge’.

Nor does the rule extend to non-high vowels, witness such morphemes as: (With *a*) /start/, ‘start’; /staart/, ‘tail’; /hard/, ‘hard’; /haard/, ‘stove’; /bard/, ‘bard’; /baard/, ‘beard’; /zwart/, ‘black’; /zwaard/, ‘sword’; /sxar/, ‘dab’, /sxaar/, ‘scissors’; /spar/, ‘fir’; /spaar/, ‘(to)save’; /dar/, ‘drone’ /daar/, ‘there.

(With *o*) /word/, ‘(to)become’; /woord/, ‘word’; /bord/, ‘plate’; /boord/, collar’; /koord/, ‘cord’; /kort/, ‘short’; /dor/, ‘arid’; /door/, ‘through’; /spoor/, ‘spur’; /por/, ‘prod’.

(With *e*) /beer/, ‘bear’; /ster/, ‘star’; /veer/, ‘feather’;/ver/, ‘far’; /γerst/, ‘barley’; /hert/, ‘deer’; /γeert/, ‘Jerry’.

As tenseness in high vowels is not distinctive before *r*, we may assume that high vowels occur only lax before *r* in the underlying *r* representation. Diphthongization, then, does not occur since it only affects tense vowels. At some point after the diphthongization rule, however, there is a special tensing rule (special in that it applies to high vowels and before *r*- only):

[+ voc] → [+ tense] / [------][+ high] [/r/][3] {[- segm]}{[+ voc]}{[- son][- grave]}

The specification + vocalic could have been left out of the environment, since tensing before *r* followed by a vowel is a special case of the Third Tensing Rule, which must also apply after Rule Dip.

There is one exception to this rule: the verb stem /kir/, '(to)coo'. The special status of this onomatopoeic morpheme can be indicated in the lexicon by representing it as /kirr/. The combination *rr* occurs only in interjections and onomatopoeic morphemes. Since /kirr/, then ends in *r* followed by a sonorant, it will not be subject to the rule.

As a result of the foregoing considerations, the diphthongization rule has the simple form:

üü → ụ̈ / ----- {[- segm][+ voc][+ cons]}

Let us now consider the exceptions to this rule in some detail;

Set A.	/bədüüzd/, 'dazed'.
	/süüz/, 'Suz'.
	/düüoo/, 'duo'.
	/düüet/, 'duet'.
	/mənüüet/, 'minuet'.
	/nüüansə/, 'nuance'.
	/rüüzii/, 'quarrel'.
	/müüziik/, 'music'.
	/müüzə/, 'muse'.
	/müüzeeöm/, 'museum'.
	/ɣrüüzləment/, 'smithereen'.
	/hüüɣoo/, 'Hugh'.

Set B.

/bədüüzd/, ‘dazed’.
/füüsii/, ‘fusion’.
/küübös/, ‘cube’.
/tüüberküüloosə/, ‘tuberculosis’.
/brüütoo/, ‘gross(weight)’.
/bruüütaal/, ‘insolent’.
/brüünetə/, ‘brunette’.
/stüüdii/, ‘study’.
/lüüsiifer/, ‘safety match’.
/lüünaapark/, ‘amusement park’.
/tüümült/, ‘tumult’.
/stüükadoor/, ‘plasterer’.
/müütaatsii/, ‘mutation’.
/püüber/, ‘adolescent’.
/rüüdiiment/, ‘rudiment’.
/lüükas/, ‘Luke’.

Set C.

/üü/, ‘you’.
/nüü/, ‘now’.
/füüt/, ‘grebe’.
/tüübə/.‘tube’.
/trüük/.‘trick’.
/brüüt/, ‘brute’.
/brüüsk/, ‘brusque’.
/üüləvel/, ‘sort of candy’.

Now we notice that the tense *üü* of set A is in the right environment for the Second Tensing Rule. We will assume that those vowels are lax at the stage where the diphthongization rule applies, and that the Second Tensing Rule follows Rule Dip.

Note that not all vowels before other vowels are underlying lax vowels. We have /köüər/,(to)stroll'; /sxöüər/, 'brush'; /slöüər/, 'veil', where - *ər*, presumably from -*er*, is not an affix. The *üü* which underlies these morphemes is already tense before the Second Tensing Rule applies.

Similarly, the *üü* in the forms of set B are in the right environment for the Third Tensing Rule. Thus the only exceptions left are those of set C.

The problem of /üü/ and /nüü/ could be solved if we were to change our original proposal that üüw comes from tense uu. Then we could claim that /üü/ and /nüü/ have vowels that are still lax at the time when diphthongization applies, and the First Tensing Rule would apply after Diphthongization only. However, I don't think it worthwile to revoke the earlier proposal which eliminated all postvocalic glides from the lexicon in view of just these two exceptional morphemes. But then we cannot put the First Tensing Rule after Diphthongization, because of the considerable number of morphemes ending in -öü.

If our proposal is correct, these must come from an already tensed lax ü. Exanples are: /öu̯/, 'onion'; /böu̯/, 'fit'; /löu̯/, 'lazy'; /röu̯/, 'moult'; /pöu̯/, ' shopfront'; /kröu̯/, '(to)trundle'; /spöu̯/, 'sluice'.

The word /füüt/ is an onomatopoeic word, the name of the bird being derived from the sound it utters. Likewise, in English, the word 'cuckoo' behaves as an exception.

The other words listed in set C are fairly recent loans, mostly from French. /üüləvel/ comes from Italian: 'olivella'.

This concludes our treatment of the diphthong öu̯. Notice that we had to argue exclusively from distributional evidence.

There are no alternations to speak of pointing to a synchronic relation between *üü* and öü. The only cases that could be cited are: ‘smithereen’, /ɣröüzləment/ and /ɣrüüzləment/, which are in free variation, and ‘devil’, /döüvl/ and /düüvl/, which are different in style only, the latter form being used an a euphemism. In the treatment just given, the first form would have an *underlying* tense *üü*, whereas the second form would have an *üü* resulting from an underlying lax *ü* later tensed before a voiced fricative.

In the absence of any alternations it is hard to see how psychological reality could be claimed for the phonological rules proposed in the present paper.

Let us now go on to consider the remaining two diphthongs *ou* and *ei*. Between *uu* and *ou*, *ii* and *ei* no relation of almost-complementary distribution holds. Suppose we still want to derive these diphthongs from underlying tense vowels. We could try this in the following way.

Wed extend the diphthongization rule to all tense high vowels:

General Dip. [+ voc] → [- voc] / [+ voc] [-][+ high] {[- segm]}{[+ voc]}{[+ cons]}.

After General Dip, just as before, the Second and Third Tensing Rules as well as the Special Tensing Rule (before *r*) apply to yield *uu* and *ii* from lax u and i, respectively.

Remaining lax *u*'s become *o*, remaining lax *i*'s stay. Only before *y i* turns into *e*.

As we find both diphthongs and the corresponding tense vowels in environments where no tensing rule applies, we must somehow prevent those tense vowels from undergoing diphthongization. The rule itself gives as a natural, though somewhat ad hoc, way of doing this: namely to represent *uu*'s and *ii*'s that fail to undergo it as underlying *uuw* and *iiy*.

At a later stage these glides would drop by a general rule:

[- voc][- cons][α back] → [- unit] / [+ voc][+ tense][α back] -.

(Tenseness is mentioned so as not to monophthongize the three diphthongs, and α backness is mentioned so as not to apply to *iiw* and *uuy*, e.g.)

This approach is not entirely free fron undesirable features, but before discussing those, I would like to bring out its assets.

It has at least five good points:

(i).

It explains the systematic constraint on the structure of diphthongs in a natural way, since it derives them from tense high vowels. Diphthongization itself is a natural process, the rule that converts lax high vowels to - high is independently motivated, except for the one part by which lax *i* becomes lax *e*.

(ii).

It explains why no diphthongs occur before *r*. (Except for a loanword like /louriir/, ‘laurel’, which must be entered in the lexicon as /luuriir/, violating the constraint that no tense high vowels appear before *r*.)

(iii).

It relates /wein+ɣaard/ and /wiŋərd/, both meaning ‘vineyard’ in the same way as /boon+ɣaard/ and /boŋərd/, both meaning ‘orchard’ are related.

The underlying representation is /wiin#gaard/ in both cases. If the word boundary stays, we get 1-3 stress, diphthongization of ii, and spirantization of *g* to ɣ. Result: /weinɣaard/. If, however, the word boundary is erased by a minor rule (taking place before stress assignment), then the *ii* is made lax by the laxing rule on page 18 (which precedes diphthongization), nasal assimilation takes place, after which *g* drops, and *aa* reduces to ə, since it does not have any stress. Result: /wiŋərd/.

Similarly, we have /boomɣaard/ from /boom#gaard/, and /boŋərd/ from the same source, but with erasure of the word boundary. Again, /sxaar+ ə+ sliip/, ‘scissors-grinder’ can be related to /sleip/, ‘(to)grind’, if we can say that in the compound form /sliip/ failed to undergo diphthongization, probably again because of erasure of word boundary (the normal word for ‘grinder’ is /sleip-ər/) and corresponding lack of stress on the final syllable

(iv).

Some of the personal and possessive pronouns of Dutch occur in two variants: a full form with *ei*, and a (generally) enclitic form with a reduced vowel *ə*. We find:

‘he’	:	/hei/,	Enclitic	/ii/.
‘she’	:	/zei/,	Enclitic	/zə/.
‘we’	:	/wei/,	Enclitic	/wə/.
‘you’	:	/yei/,	Enclitic	/yə/.
‘me’	:	/mei/,	Enclitic	/mə/.

Also:

‘my’	:	/mein/,	Enclitic	/mən/.
‘his’	:	/zein/,	Enclitic	/zən/.

If we derive the forms with *ei* from underlying *ii*, then we do not have to say that the vowel reduction rule takes a sequence of two segments (vowel+glide) and converts it into *ə*. Instead we can claim that enclitics do not undergo the First Tensing Rule or perhaps the diphthongization rule. The latter claim would be preferable, since it would be somewhat awkward (though not impossible) to defend the presence of a morpheme boundary in the form /zein/, as /zei/ means ‘she’ and also ‘they’, but never ‘he’, and /zein/ means only ‘his’, never ‘her’ or ‘their’.

(v). It.explains a curious gap observed by the authors[4)] of ‘Fonologie van het Nederlands en het Fries’ (o.c. chapter on distribution). They noticed that after *y* all vowels and diphthongs occur except only for tense *ii*. Lax *i* does occur, as in /yixt/, ‘gout’ and the diphthong *ei* too, as in /yei/, ‘you’. No morpheme, however, contains the sequence *yii*.

Now, the approach outlined above, claims that the only source for morphemes of the form *yii*---- is *yiiy*----. And we may observe that, more generally, there are no syllables of the form y + V + y. So the non-occurrence of *ii* after *y* follows from a general constraint on syllable structure. No other account of diphthongization could relate these facts.

The last three arguments are, admittedly, not very strong, but the first two do carry some force.

Let us now consider the disadvantages of extending the diphthongization rule to all high vowels.

(i).
A very serious drawback is that we must give up our earlier claim that in lexical representations glides do not occur after vowels. In order to account for unchanged *ii* and *uu* we have had to postulate underlying glides after these vowels in all contexts, especially before consonants.

(ii).
There is no independent motivation for glides in such positions.

(iii).
This treatment does not explain why *ou* occurs mostly before dentals and boundaries.
(There are loan words, though, where *ou* occurs before non-dentals, /ouγöstös/, 'August'; /ouγöork/, 'gherkin'; /oubaadə/, 'aubade'; /oulaa/, 'auditorium'; /inouγüüreer/, '(to)inaugurate'; /poupr/, 'pauper'; /pouk/, 'kettledrum'.)

We may attempt to handle this by restricting the *uu* diphthongization rule so as not to apply before consonants. Apart from the words /pols/, 'pulse' and /koldr/, 'staggers', which we could enter in the lexicon with lax *u* instead of lax o, we notice that there are in Dutch no occurrences of *l* after *o* when followed by a dental. This indicates that something has happened to *l* in this context.
There are also some minor alternations, like:

/wil/, 'want'. Past tense: /wou/, obsolete form: /woudə/.
/zol/, 'shall'. Past tense: /zou/, obsolete form: /zoudə/.
/houd/, 'hold'. Past tense: /hiild/.
/zout/, 'salt. Adjective: /zilt/, 'saltish'.
/woud/, 'forest'. Adject. /wild/, 'wild'.
/mout/, 'malt' in free variation with /malt/.
/koud/, 'cold'. Adjective: /kil/, 'chilly'.
/bout/, 'quarter(of an animal) and /bil/, 'buttock'.

All this might led us to postulate a (historically correct) rule that turns *ol* to *ow* before dentals. But this proposal fails if phonological theory does not allow us to state the absence of simple morpheme boundaries in a phonological rule. For, before the third person ending *-t*, or the past tense suffix *də* (which might have the weakest kind of boundary there is) the segment *ol* stays:

/hol+t/, ‘runs’; /hol+d‘/, ‘runned’.
/rol+t/, ‘rolls’ /rol+d‘/, ‘rolled’.
/stol+t/, ‘curdles’; /stol+d‘/, ‘curdled’.

Since the constraint on phonological rules mentioned above seems well motivated, the proposal of synchronically deriving *ou* from **ol* must be abandoned.

The only remaining possibility, then, is to enter *ou* in the lexicor as *uw* (or even directly as *ow*). The non-occurrence of *ou* before non-dentals can then be accounted for on the basis of the observation that after a vowel followed by a grave consonant only dentals are allowed within single morphemes.‘Consonant’ must be interpreted here as the feature ‘- vocalic’.

But if before consonants *ou* must be represented as *uw*, why bother to derive *ou* from *uu* in the other cases? It is certainly simpler to represent all *ou*'s in the lexicon in the same way.

And if we admit *u* to be followed by *w* in the lexical representation we could just as well allow *i* to be followed by *y*, later changing *iy* to *ey*. Then we have two underlying vowel glide sequences. The rule of diphthongization is then again restricted to *üü*.

Doing this yields us the following result:

öu̯ derives from underlying üü
ou̯ derives from underlying uw
ei̯ derives from underlying iy.

This situation shows a definite lack of symmetry in dissociating *ëü* from the other two diphthongs.

We might try a different solution and claim now that all tense non-high non-low vowels can be followed by a glide which agrees both in backness (gravity) and rounding. So we would have underlying *ow*, *öy*, *ey*. A lack of symmetry still remains: *w* and *y* also occur before vowels, whereas y never does, but may follow *ö* only.

In this approach, we have underlying öy, and so we should not want to assume underlying *üü* also, given the (almost) complementarity in distribution between those two segments. Therefore, we will have to adopt the reverse of the earlier diphthongization rule. But if there is no underlying tense *üü*, there cannot be an underlying lax *ü* either (in the assumption that tenseness is distinctive for Dutch vowels).

To account for the failure of the diphthongs to occur before glides and before *r*, we can make a rule deleting glides before glides and before *r*. For öy we must make a special provision, namely, it turns into *üü* in that context. In this approach, then, we face the curious fact that the *only* source for the pure vowel *üü* is an underlying diphthong.

We now have as underlying vowels: a, e, i, o, u, ö, tense and lax. Since the theory of Markedness does not allow a vowel system to have *ö* unless it also has *ü*, we must assume that *ü* underlies *ö* and so we need a lowering rule.

This rule is a slight generalization of the one given on page 12:

[+ voc][+ round][<- tense>] → [- high] / [-][<+ back>]

If this approach is the correct one, we have the following underlying vowel system for Dutch, vowels occurring both tense and lax:

i ü u

e o

a

In addition, there are the underlying vowel glide sequences: ey, üy, ow. It is interesting to note that just the 'interior' vowels of the vowel triangle may take glides after them. This is a most unnatural class.

Eindnoten:

1) I am very grateful to Professors G.H. Matthews (M.I.T.) and E. Wayles Browne (Yale) with whom I discussed many of the problem touched upon in this paper. Their insights have been invaluable.
2) By '[/ə/]' I mean to designate in an informal way the set of features needed to define the neutral vowel *ə*.

2a) A standard reference for the history of the Dutch language is: M.Schonfeld: Historische Grammatica van het Nederlands. (Zutphen)

3) '[/r/]' abbreviates the set of features needed to define Dutch *r*
4) See full reference on page 9.